Commission in detailed evaluation of a whole host of factors, such as link budgets and other technical parameters, for each applicant.

In addition, an MSS system can be designed to anticipate changes in international regulations, such as increased power limits, which may affect the provision of services several years hence, once implementation has been completed. Applicants should be allowed this flexibility instead of being shackled to prematurely developed service standards.

In any event, a service standard is not necessary. If applicants are required to design systems capable of providing coverage on a global basis, they will have every incentive to use those systems to their fullest profitable extent. It would make no sense for a licensee to leave dormant the 90% of its system which does not serve the United States at any given time.

Likewise, LQP objects to Motorola's proposal to require that each applicant establish significant portions of its terrestrial infrastructure in order to be eligible for licensing. See Motorola Comments, at 19-20. The Commission's coverage standards are for space station licenses. Requiring an eligibility standard for earth stations is outside the parameters of a space segment license. Moreover, the global coverage standard is to specify the design of the system, not its business plan. The Commission does not need to become engaged in evaluating the feasibility of an applicant's terrestrial service plan simply to decide whether a system design provides global coverage.

Motorola's proposed standard would also require applicants to represent that they will be able to obtain appropriate gateway authorizations from many different countries, a process over which neither the applicants nor the Commission has control. This proposed terrestrial infrastructure standard is not feasible nor useful for MSS Above 1 GHz.

In sum, the global coverage eligibility criterion proposed by the Commission substantially serves the Commission's goal of ensuring that licensees design a state-of-the-art global system that will serve the public interest. With the exception of a slight modification to the definition of the geographic areas which such systems will be required to cover, the Commission should adopt the global coverage rules set forth in its NPRM.

2. United States coverage. As stated in its initial comments, LQP supports the Commission's proposed U.S. coverage standards, which will achieve the goal of providing the kind of ubiquitous nation-wide communications service to which satellite service is uniquely suited.[25] See LQP Comments, at 20-21.

For the same reasons stated in the previous section concerning global coverage standards, LQP supports the proposed geometric standard for U.S. coverage and opposes comments that advocate increases in the minimum elevation angle and imposition of a service standard. See Ellipsat Comments, at 33; Motorola

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[25] In addition, LQP reiterates its view that satellite failures, as well as obstructions and propagation phenomenon, should be taken into account in implementing the requirement that licensees provide "continuous" domestic service. See LQP Comments, at 21-22.

Comments, at 20-21. Each of the applicants is proposing MSS Above 1 GHz eligibility requirements based on its own system design, thereby attempting to preclude other designs which comport with the Commission's approach to this service. LQP recommends rejection of these system-specific proposals.

In this vein, LQP opposes the suggestion by TRW that the Commission's proposal be interpreted not to require the provision of voice service on a nationwide basis. See TRW Comments, at 31-33. Voice services are necessary to meet the goals set forth by the Commission, as stated in the NPRM:

> Domestically, this service will help meet the demand for a seamless, nationwide communications system that is available to all and that can offer a wide range of voice and data telecommunications services. In addition to enhancing the competitive market for cellular-like services in those areas served by cellular providers, this new mobile satellite service will offer those Americans in rural areas that are not otherwise linked to the communications infrastructure immediate access to a feature-rich communications network.

NPRM, 9 FCC Rcd at 1096, ¶ 3. Indeed, the Commission has consistently indicated that Big LEO systems, unlike their small LEO counterparts, should "include voice communications."[26] Notice of Proposed Rulemaking, 6 FCC Rcd 5932, at ¶ 1 n.1 (1991). Adoption of TRW's proposal would blur the distinction between the NVNG and 1.6/2.4 MSS services.

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[26] The Commission's proposed definitions of "Mobile-Satellite Service" and "1.6/2.4 GHz Mobile-Satellite Service" do not include a voice service requirement. See Proposed 47 C.F.R. 25.201 in NPRM, 9 FCC Rcd at 1155.

LQP also opposes the suggestion of Motorola that the U.S. coverage rule be expanded to include all U.S. possessions and territories. Mandating continuous voice coverage of territories and possessions such as Guam and American Samoa at the outset of the licensing process would impose costs which far outweigh any concomitant benefits. These island territories may require their own terrestrial gateways, despite the fact that service demands would unlikely justify a substantial investment in the infrastructure.

C. A Spectrum Efficiency Standard Should Be Adopted.

In its initial comments, LQP explained how a spectrum efficiency standard would improve MSS by ensuring that all systems have enough capacity to operate without impairing overall service quality. See LQP Comments, at 22-24. The principal contention of those applicants arguing against such a standard is that it is unnecessary because economic forces will provide incentives to maximize system capacity. See Constellation Comments, at 38-39; TRW Comments, at 35; Ellipsat Comments, at 34. This argument misses the point. One system may view limited capacity for serving high-end niche markets as economic maximization of its spectrum assignment.[27]

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[27] Constellation's contention that a spectrum efficiency standard "would necessarily involve the Commission in detailed and controversial engineering judgments" does not preclude its adoption. See Constellation Comments, at 39. Review of spectrum efficiency would require no more analysis than review of the global coverage requirement which Constellation supports.

Spectrum is far too valuable a resource to allow the operation of small, inexpensive and inefficient systems. Such systems would serve relatively few users while consuming just as much spectrum and imposing just as much interference as larger systems providing substantially more capacity. The Commission should encourage high capacity systems which provide access to a variety of consumers to "hasten the development of universally available communications networks" and "ensure universal service." See Chairman Hundt, Speech to World Telecommunication Development Conference (Mar. 22, 1994); Vice President Gore, Speech to International Telecommunications Union (Mar. 21, 1994); see also NPRM, 9 FCC Rcd at 1096, ¶ 3. The Commission should establish a standard that will maximize the use of scarce spectrum in the provision of MSS and, at the same time, ensure efficient sharing between CDMA systems.

D. The Comments Demonstrate That the DOMSAT Financial Standard Is Appropriate for MSS Above 1 GHz.

LQP supports the proposed application to MSS Above 1 GHz of the financial qualification requirements used by the Commission to govern the Domestic Fixed-Satellite Service (DOMSAT). The record reflects a consensus that the Commission must, however, clarify an ambiguity in its articulation of the standard. See, e.g., LQP Comments, at 25-27; Motorola Comments, at 26-27; TRW Comments, at 37-41. The rule governing financial qualifications for DOMSAT licensees, on which the Commission's proposal is based, does not require evidence of "uncommitted current assets."

Indeed, an uncommitted current assets test was expressly rejected in the DOMSAT proceeding. See Licensing Space Stations in the Domestic Fixed-Satellite Service, 58 RR 2d 1267, at ¶ 13 (1985). While it appears that the Commission intended to adopt the DOMSAT rules intact, the text of the NPRM calls for evidence of "uncommitted current assets." NPRM, 9 FCC Rcd at 1108, ¶ 27. The Commission, therefore, must clarify this ambiguity by affirming its intention to adopt the long-standing and effective DOMSAT rules without such a modification.

Motorola proposes that the Commission make the financial standards more demanding by requiring applicants for MSS Above 1 GHz licenses to demonstrate an ability to "meet the estimated costs of constructing and launching all planned satellites and operating the entire constellation for one year after all the satellites composing the full constellation are launched." Motorola Comments, at 26. Motorola claims that the relatively large number of satellites in each MSS LEO constellation and the length of time required to launch a full constellation warrant a stricter financial showing. Id.

LQP agrees with Motorola that the Commission should maintain meaningful financial standards in order to ensure that MSS LEO licensees have the financial ability to launch and operate an entire constellation. However, Motorola's recommended showing is based on an erroneous premise: some MSS LEO systems, for example GLOBALSTAR, can in fact become operational and generate revenue before the entire constellation is in place. Cf. Motorola

Comments, at 26 n.23. Motorola's proposed financial eligibility standard thus appears tied to a showing of commercial capability but that is not necessarily tied to completion of construction.

Moreover, Motorola's revision may produce results contrary to the public interest. If the Commission set the stringent financial standard proposed by Motorola, applicants would be encouraged to design small, spectrally-inefficient LEO systems which could be constructed, launched and operated for one year at costs considerably less than those of larger constellations. Cf. LQP Comments, at 22-24 (explaining need for MSS Above 1 GHz spectrum efficiency standard). In contrast, the Commission's proposal, based on operational costs for the year following the launch of the first satellite (NPRM, 9 FCC Rcd at 1109 n.57), does not penalize or reward applicants on the basis of the number of satellites in their constellations. LQP recommends that Motorola's proposal be rejected, and that the Commission's proposal to apply the DOMSAT standard be adopted because it would "set objective criteria that [can] easily and consistently be applied to identify applicants who are financially capable of proceeding with the construction and launch of their proposed satellites immediately upon grant of their applications." DOMSAT, 58 RR 2d at 1272, ¶ 10.

Other commenters propose that the Commission loosen the financial qualifications. See, e.g., TRW Comments, at 41-45; Ellipsat Comments, at 34-39. These commenters suggest that the Commission should adopt financial standards similar to those

adopted for the Non-Voice, Non-Geostationary MSS (NVNG MSS).[28] TRW recommends that the rules simply require licensees to demonstrate the ability to finance the construction, launch and operation for one year of the portion of the system needed to provide commercial service over the United States. TRW Comments, at 43-44. In making these recommendations, however, these commenters fail to note inherent differences between NVNG MSS and MSS. NVNG MSS is not a global system. Two of the three NVNG MSS applicants have requested authority to operate solely in the United States, the third seeks international authority only.

"Big LEOs," on the other hand, are inherently global. The TRW proposal would fly in the face of the Commission's stated goal -- to provide "those countries that have not been able to develop a nationwide communications service an 'instant' global telecommunications infrastructure at minimal cost." NPRM, 9 FCC Rcd at 1096, ¶ 2. A requirement that licensees be financially qualified to provide service only to the United States would not establish that they could provide the global service sought by the Commission for MSS Above 1 GHz. Moreover, NVNG MSS is a non-voice system. The cost of constructing, launching, and operating an NVNG is a fraction of that required for an MSS Above 1 GHz system.

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[28] See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile Satellite Service, 8 FCC Rcd 8450 (1993) ("NVNG MSS Order"). NVNG MSS applicants must demonstrate the current financial ability to construct, launch and operate for one year the first two satellites in their systems. NVNG MSS Order, 8 FCC Rcd at 8451, ¶ 5.

Ellipsat goes a step further and suggests that in order to "allow participation by small businesses," the Commission should be flexible in determining whether applicants have satisfied the financial qualifications. Ellipsat Comments, at 40-42. But, the size of the company should not drive qualification standards. MSS Above 1 GHz licensees will be using the same spectrum and causing interference to each other and other users of the bands. Therefore, all licensees should be held to the same level of scrutiny with regard to whether they have satisfied the financial standards.

The Commission considered and rejected such relaxation of the financial standards for satellite applicants in the DOMSAT proceeding:

> We recognize that small firms will have difficulty meeting this standard. However, small or newly established companies will also face great difficulties in arranging for the . . . financing necessary to build and launch a satellite system in any event.

DOMSAT, 58 RR 2d at 1271, ¶ 9. The same reasoning should be applied to reject the suggestions for a relaxed financial standard for MSS Above 1 GHz.

Ultimately, the proposals of TRW, Ellipsat and Constellation undermine the purpose for a financial showing. Rather than set the financial requirements at a level that reflects estimates of underlying costs, these applicants want the standard set at the hurdle the applicants are capable of jumping. This is inconsistent with the purpose of a financial standard to

establish which applicants are likely to go forward promptly with construction, launch and operation of their proposed systems.

E. The Commission Has the Authority to Adopt Rigorous Eligibility Requirements for MSS Above 1 GHz.

As all of the LEO applicants who commented on the issue amply demonstrated, the Commission has authority to establish eligibility criteria that may result in the dismissal of non-conforming applications without a hearing. See LQP Comments, at 28-29; Motorola Comments, at 28-32; TRW Comments, at 13-15. Almost forty years ago, the Supreme Court upheld such rulemaking authority where the Commission established threshold eligibility criteria that rendered a pending application ineligible. See United States v. Storer, 351 U.S. 192 (1956); Hispanic Information & Telecommunications Network v. FCC, 865 F.2d 1289 (D.C. Cir. 1989); see also TRW Comments, at 12 n.16. Particularly where the Commission grants parties an opportunity to amend pending applications so that they conform to new eligibility standards, denial of an application for failure to conform is not precluded by the hearing requirement of Ashbacker Radio Corp. v. FCC, 326 U.S. 327 (1945). In sum, the Commission's decision to impose eligibility requirements for MSS Above 1 GHz falls squarely within the Commission's legal authority.

V. SHARING BETWEEN MSS ABOVE 1 GHZ SYSTEMS AND OTHER SERVICES CAN BE ACCOMPLISHED IN THE 1.6/2.4 GHZ BANDS.

LQP has demonstrated why MSS systems should be given access to the entire 1610-1626.5 MHz and 2483.5-2500 MHz bands, and can protect services which operate in-band or adjacent to these bands. The other commenting parties provide no support to justify any other conclusion by the Commission.

A. Radio-Astronomy Service. The comments of the radioastronomy community are consistent with LQP's proposed approach for protecting the Radio-Astronomy Service (RAS). These comments also provide an additional rationale for limiting the operation of the FDMA/TDMA system to the upper 5.15 MHz of the 1610-1626.5 MHz band.

First, whatever rules are adopted to protect radioastronomy, the Commission must ensure that CDMA systems have adequate bandwidth in which to relocate users when protecting radioastronomy sites. Spectrum assignments significantly removed from the RAS band are required for this purpose. See LQP Comments, at 64; Reply Tech. App., at § 2.1. This requirement was emphasized by the request of the Committee on Radio Frequencies (CORF) that, in addition to protecting the 1610.6-1613.8 MHz band, the 1613.8-1615.8 MHz band should also be included in the protection zone rules to protect RAS from out-of-band emissions. CORF Comments, at 2-4.

Based on CORF's proposed modifications to Sections 25.213(a)(i) through (viii), CDMA MSS systems would require L-

band spectrum from 1610 to at least 1620.5 MHz to enable CDMA MSS systems to accommodate MES users while protecting radioastronomy operations. Ensuring that spectrum up to 1621.35 MHz can be used would provide a choice of two or three channel frequencies on which to relocate MES signals near RAS sites.

With regard to CORF's specific proposed revisions to Sections 25.213(a)(i) through (viii), LQP is in general agreement. See Reply Tech. App., at § 2.1.1. MSS transmissions, on whatever frequency used in the 1610-1626.5 MHz band, should protect radioastronomy observations. CORF's proposals appropriately address the need to protect radioastronomy from emissions both within 1610.6-1613.8 MHz and emissions above these frequencies which could also cause interference to radioastronomy operations. See CORF Comments, at 2. In addition, LQP supports CORF's suggestion to provide optional approaches for MSS systems in protecting radioastronomy operations.

LQP also believes useful CORF's suggestion to consider revisions to the rules in light of actual operating experience once MSS systems are implemented. As CORF indicates, actual operating experience will enable accurate measurements of out-of-band characteristics of mobile earth stations (MES), possibly enabling adoption of "smaller protection zones and/or a smaller guard band." CORF Comments, at 4. The Commission's final rules should not preclude such future coordination.

With regard to CORF's modification of Section 25.231(v), LQP can agree with most of the proposed changes. LQP recommends that

the Commission adopt the rule as revised by CORF, but with a modification which would provide MSS system operators sufficient operational flexibility in the protection of radioastronomy. LQP proposes that the Commission adopt the following language for Section 25.231(v):

> (v) The EMSU shall maintain a current schedule of the periods and locations of radio astronomy observations in the band 1610.6-1613.8 MHz. The schedule shall be available, preferably in computer readable format, for consultation by MSS system operators. The mobile satellite systems shall be capable of preventing the operation of mobile Earth stations within the protection zones specified in (i), (ii), or (iii) above, on any frequency in the 1610.6-1615.8 MHz band after the first position fix of the mobile terminal either prior to transmission or based upon its location being within the protection zone at the time of initial transmission of the mobile terminal.

To adopt CORF's suggested language would require procedures to terminate calls initiated outside a protection zone where the terminal moves within the protection zone during the call. Such procedures would be inordinately complex and costly. LQP's suggested approach strikes an appropriate balance which will afford protection to radioastronomy without imposing unnecessary burdens on operators or users of MSS systems.

In addition to protecting radioastronomy operations in the 1610.6-1613.8 MHz band, the Commission should consider adopting measures to protect passive use of the 1610-1667 MHz band. The Arecibo Observatory in Puerto Rico is involved in important astronomical research in this frequency band. Cornell University, which operates Arecibo, pointed out that the downlink in the 1613.8-1626.5 MHz band could have a "disastrous effect" on

such research, similar to that caused by the GLONASS system. See Cornell Comments, at 3-5. Radioastronomy does not have a primary allocation above 1613.8 MHz, and so, Cornell does not seek protection for its astronomical research. However, LQP supports Cornell in its desire "to explore avenues to preserve access to this unique band for astronomical observations." Id. at 5.

The Commission must also account for Cornell's concern regarding the allocation for MSS secondary downlinks in the MSS user uplink. According to Cornell University, "the allocation of an MSS downlink in the 1610-1626.5 MHz band can close another valuable window to the Universe. Future expansion of the downlink allocation in order to accommodate the need for spectrum ... could close this window even further." Id. The concerns of the radioastronomy community thus provide an additional public interest rationale for limiting secondary MSS downlink transmissions to the 5.15 MHz proposed in the Commission's NPRM, and not providing any mechanism for reassignment of CDMA spectrum to the TDMA segment. See supra at § II.D.

With regard to the comments of Motorola on the proposed rules for protection of radioastronomy, LQP objects to Motorola's recommended relaxation of the emission limitation on MSS space stations transmitting in the 1613.8-1626.5 MHz band. Motorola Comments, at 54-55. The Commission should not accept for Section 25.213(a)(2) an emission limit applicable to secondary operations for protection of a primary service allocation. Motorola

provides no technical analysis to demonstrate any defect in the Commission's proposed emission limit. The Commission, in Rule Section 25.213(a)(3), similarly proposed an emission limitation on space stations operating in primary service allocations. LQP believes both rules are reasonable and should be adopted. See Reply Tech. App., at § 2.1.2.

B. Aeronautical Radio-Navigation and Radio-Navigation Satellite Services. LQP proposed an out-of-band emission limit to protect both GPS and GLONASS, operating below 1606 MHz, and urged the Commission to make available the entire 1610-1626.5 MHz band for use by MSS. The comments by other applicants in this proceeding, arguing for an "interim plan" for MSS, are not supported by any meaningful technical analysis. See TRW Comments, at 125-29; Ellipsat Comments, at 15-17; Constellation Comments, at 49-52.

The Federal Aviation Administration (FAA), Aeronautical Radio, Inc. (ARINC), Air Transport Association (ATA), and Rockwell International (Rockwell) propose that the Commission adopt a "transition plan" which would restrict MSS use of the 1610-1616 MHz band until the Russian GLONASS system has been shifted out of the band. But even in its comments, the FAA states, "[w]ith respect to GLONASS, the protection band is 1598-1610 MHz. This band encompasses GLONASS antipodal operation and downward shifts in frequency of up to 6 channels." FAA Comments, at 3. The FAA, ARINC and ATA demand protection of individual GLONASS signals but have never provided analysis of why such

protection is required to enable the navigation function to be fulfilled with reliability and certainty. LQP has demonstrated in both the Technical Appendix to its initial comments and its Reply Technical Appendix, that these requests are not supportable and are unnecessary. See LQP Comments, at 65-73, Tech. App., at § 2; Reply Tech. App., at § 2.2.1.

The FAA, in Reply Comments filed June 6, 1994, objects to the out-of-band emission limits proposed by LQP for protection of both GPS and GLONASS from MSS transmissions. However, it provides no analysis to explain or support its objections. The FAA further indicates that it may seek protection for GPS for a wider bandwidth than previously indicated. The FAA states that, "[r]ecent developments in the field of signal detection indicate that up to +/- 15 MHz from the GPS center frequency may need to be protected," in contrast to the +/- 10 MHz protection bandwidth in the FAA's May 5 filing. FAA Reply Comments, at 2. LQP explains in detail in the Reply Technical Appendix why the Commission should reject the FAA's proposals. See Reply Tech. App., at § 2.2.2.

The FAA also states its support of a "transition plan" to protect GLONASS until the Russian Federation can, in fact, accomplish the shift to full antipodal operation. FAA Reply Comments, at 3. The United States should not adopt a "transition" plan when there does not appear to be a plan by the FAA to use GLONASS, and a transition plan would send the wrong

signal to other countries as well as equipment manufacturers. See supra at § II.B.

Although ARINC/ATA also seek a transition plan, their comments concur with the applicability of the uplink EIRP density limit of -15 dB(W/4 kHz) in the band 1610-1626.5 MHz when GLONASS is moved below 1610 MHz. ARINC/ATA Comments, at 2-3. ARINC/ATA, however, argue that "GLONASS must be protected as part of the international GNSS." Id. at 4. As indicated by the FAA's comments and reply comments, the issue of U.S. support for inclusion of GLONASS in a GNSS (Global Navigation Satellite System) has not been determined. The FAA does not state that the U.S. supports inclusion of GLONASS in a GNSS.[29] In fact, the FAA, in its Reply Comments, states, "[i]t should be obvious that the GNSS is still in its infancy. The United States is moving ahead briskly with the development of its own entry, GPS." FAA Reply Comments, at 4. With regard to GLONASS, the FAA states that it "is actively being studied as to how it will best fit into the overall GNSS as implemented domestically, and internationally." Id. Accordingly, there is no basis to adopt ARINC/ATA's position.

LQP disagrees with the FAA's comments that LQP is inappropriately seeking a protection level that would permit possible interference to individual GLONASS transmissions.

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[29] Indeed, the FAA recently issued a request for proposals for a wide area augmentation system. See Telecommunications Reports, Vol. 60, No. 24, at 29 (June 13, 1994). This suggests that it is abandoning its prior proposed utilization of GLONASS.

Neither the FAA nor ARINC/ATA have provided explanation and support for the contention that MSS must never cause interference to individual GLONASS transmissions. The criteria for harmful interference in the Radio Regulations is interference with the function of the radio service, not interference with single transmissions.[30] The Commission should adopt the approach proposed by LQP. And, if necessary, the appropriate forum to resolve the issue is the International Civil Aviation Organization.

Rockwell proposes restricting MSS systems from using the 1610-1616 MHz band, but provides no information on Rockwell's specific interest in using GLONASS or manufacturing GLONASS receivers. Rockwell provides no support for its position beyond a paper submitted last year to the MSS Above 1 GHz Negotiated Rulemaking Committee. Rockwell Comments, at 3. By contrast, another avionics manufacturer, Honeywell, Inc. (Commercial Flight Systems Group), supports the licensing of MSS systems in the 1.6/2.4 GHz band, because of the usefulness of global satellite/cellular service to American businesses. See Honeywell Comments.

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[30] See Radio Regulation 163 which defines Harmful Interference as "[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with these Radio Regulations." Radio Regulations, International Telecommunication Union, Art. 1 (1990) (emphasis supplied); see also 47 C.F.R. § 2.1.

LQP believes that the approach contained in its initial comments, subject to minor modifications provided below, offers an appropriate balance between the interests of aeronautical radionavigation and MSS. In response to the comments of the aviation community, LQP has continued to analyze the impact of impairment of receipt of a single GLONASS signal on navigation. An updated analysis of Attachment 1 to LQP's May 5, 1994 Technical Appendix is provided in the Reply Technical Appendix. This analysis takes into account the concerns raised and parameters used by the FAA in its analysis.

LQP's further analysis confirms that satellite navigation can be accomplished using GPS plus one-fourth to one-half of the GLONASS constellation, consequently eliminating the need to track GLONASS satellites operating on channel assignments above 1606 MHz. Thus, GLONASS could be successfully used as a part of the GNSS, in its current configuration. Moving the entire GLONASS constellation below 1606 MHz would only serve to strengthen its ability to supplement the U.S. GPS system.

Other options for accomplishing satellite sole means navigation continue to be studied, and offer viable alternatives to the use of GLONASS. These options include use of GPS along with a wide area augmentation system (WAAS), additional geosynchronous satellites, or LEO systems such as GLOBALSTAR. From a visibility standpoint, a full GPS constellation with two additional geosynchronous spacecraft is sufficient to satisfy all accuracy, availability and integrity requirements in all phases

of flight except precision approach. Similar performance can be achieved with GPS and six additional GLONASS or GPS satellites operated in coordination with GPS. Within the United States, certified GNSS receivers also will incorporate barometric aiding and will utilize ranging signals (and integrity information) from two additional geosynchronous satellites, by the time GLOBALSTAR is operational.

LQP's analysis supports the conclusion that: (1) GLONASS satellites operating on channels 1 through 6 in an antipodal manner are sufficient to provide GNSS with the desired integrity; (2) GLONASS channels 22, 23 and 24 (now operating above 1610 MHz) plus channels 7 through 12 are not required to enable GLONASS to be used as part of GNSS (nor will these satellites likely be present when GNSS is implemented); and (3) the MES EIRP density limits proposed by LQP provide a high confidence level that MES units will not interfere with aviation users' ability to navigate using GNSS.

In light of LQP's analysis of the filed comments, the following change to the first sentence of proposed Section 25.213(b) is recommended to provide protection to both GPS and GLONASS as a part of GNSS. This revision proposes a higher level of protection to GPS than proposed in LQP's initial comments.

25.213(b)

Protection of the radio navigation-satellite service operating in the 1559-1610 MHz band. Mobile Earth stations operating in the 1610-1626.5 MHz band shall limit out-of-band emissions in the 1574.397-1576.443 MHz band and the 1598 to 1606 MHz band so as not to exceed an e.i.r.p. density level of -55 dB(W/MHz) and

-50 dB(W/MHz), respectively, averaged over any 20 ms period.

LQP continues to recommend, as did Constellation Communications, that the last two sentences of proposed Section 25.213(c)(1) be deleted. See Constellation Comments, at 50-52.

The above-described approach will adequately protect both GPS and GLONASS operating below 1610 MHz, alert receiver manufacturers that filters on GLONASS receivers should be located no higher than 1606 MHz, motivate Russia to finalize its agreement to implement the frequency revision of GLONASS, and enable MSS to proceed with adequate spectrum and sufficient certainty to reach agreements with other administrations.

C. Terrestrial Services (In-Band). Motorola recommends that proposed Section 25.213(d) be modified to indicate that the obligation to coordinate is required only on the basis of Resolution 46, adopted at WARC-92. Motorola Comments, at 56. Constellation argues that no rule is required, because RR 730 is applicable only to systems outside the United States. Constellation Comments, at 53.

LQP agrees with both these parties. However, should the Commission adopt the proposed rule, LQP urges the Commission to adopt the slightly higher PFD recommended in LQP's reply comments, rather than that proposed in LQP's initial comments. In its initial comments, LQP urged the Commission to adopt revised PFD values applicable to the 2483.5-2500 MHz band. LQP provided support for increasing these levels, including a demonstration that operation of GLOBALSTAR at these levels would

not cause harmful interference to terrestrial fixed services. Recent analysis supports the conclusion that operation of GLOBALSTAR at the higher PFD level proposed in the Reply Technical Appendix would not cause harmful interference to terrestrial analog fixed point-to-point or point-to-multipoint systems. See Reply Tech App., at § 2.3.2. Further, papers submitted to ITU-R Task Group 2-2 (see Attachment 2 of the Reply Technical Appendix) show conclusively that PFD levels of -147 dB(W/m^2/4kHz) from 0° to 5° and -134 dB(W/m^2/4kHz) above 25° per satellite do not cause harmful interference. (A Preliminary Draft New Recommendation has been submitted to U.S. Task Group 2-2 supporting these levels.) These higher PFD levels would allow CDMA LEO MSS systems to enhance their capacities, and eliminate the need for any coordination with fixed service in the United States, while continuing to protect the remaining FS operations.

D. Terrestrial Services (Adjacent Band). As demonstrated in LQP's initial comments and Technical Appendix thereto, ITFS/MMDS systems operating above 2500 MHz will not cause harmful interference into CDMA LEO MSS operations in the 2483.5-2500 MHz band. LQP Comments, at 78, Tech. App., at § 2.3. LQP's analysis demonstrates that the concerns expressed by the Wireless Cable Association International (WCA) and National Telephone Cooperative Association (NTCA) that MSS systems may not be able to use the 2.4 GHz band are groundless. LQP's Reply Technical Appendix demonstrates that protection for ITFS/MMDS booster

stations also falls within the analysis presented in LQP's initial comments. See WCA Comments, at 4-5.

TRW also concluded that ISM would not cause interference to MSS systems. It suggested that the Commission initiate a proceeding "to reassess the permissible levels of unwanted emissions from ISM devices, in order to maximize the possibilities of spectrum sharing between ISM and other services." TRW Comments, at 133. LQP does not believe that such a proceeding would enable implementation of ISM devices built to more stringent requirements within the time frame for implementation of LEO MSS. In any event, the Commission does not need to conduct such a proceeding prior to authorizing LEO MSS systems to use the 2483.5-2500 MHz band.

VI. THE COMMISSION HAS DEVELOPED A SUFFICIENT RECORD TO PROCEED WITH C-BAND FEEDERLINKS FOR MSS LEO SYSTEMS.

Feeder link spectrum below in C-band is critical to the implementation of the GLOBALSTAR technical and operational design and service concept.[31] LQP Comments, at 85-86. LQP's preferred feeder links are:

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[31] Teledesic Corporation requested that the issue of feeder links for LQP, Constellation and Ellipsat not be included in the 28 GHz Negotiated Rule Making and that these parties be excluded from participation in that NRC. Teledesic Comments, at 5-7. While LQP will continue to seek feeder link spectrum in frequency bands below 15 GHz, it is an interested party within the meaning of the Negotiated Rulemaking Act, and as such, must be permitted to participate in the Negotiated Rulemaking. See Negotiated Rulemaking Act, 5 U.S.C. § 584(b); Notice Concerning the Establishment of the 28 GHz Negotiated Rulemaking Committee, 59 Fed. Reg. 7961, 7962 (Feb. 17, 1994).

Uplink

200 MHz in the 5000-5250 MHz band

Downlink

200 MHz in the 6875-7075 MHz band

Neither the Comments nor the Reply Comments filed by the FAA provide any information on proposed use of 5 GHz frequencies for aeronautical radionavigation. FAA's recitation that it "cannot act capriciously nor can it bind itself to the timetable of some other community" is in contravention of this Administration's policy of promoting new commercial telecommunications services. See Vice President Gore, Speech to the International Telecommunications Union (Mar. 21, 1994). The LEO MSS applicants which would use this frequency band for MSS feeder links seek to share the band with potential aeronautical radionavigation services rather than use the band on an exclusive basis.

LQP, as demonstrated in Section 3 of the Reply Technical Appendix, can operate its MSS feeder uplinks co-channel with aeronautical radionavigation systems without causing harmful interference. LQP has conducted an extensive analysis to evaluate how it can locate its gateway earth stations in such a manner as to minimize impact on potential aeronautical radio navigation services. LQP continues to seek the cooperation of the FAA and the NTIA in identifying appropriate methods for operating MSS feeder links in the 5000-5250 MHz band.

At the recent international meeting of ITU-R Task Group 4/5, addressing MSS feeder links, the group concluded that:

TG 4/5 is of the preliminary view that:

> - sharing of non-GSO MSS feeder-links (both downlinks and uplinks) with ARNS systems in the 5.00-5.25 GHz band would appear feasible, since the interference into MLS receivers would be within the assumed permissible levels.[32]

In an effort to obtain information from the aviation community concerning the feasibility of sharing of the 5.00-5.25 GHz and 15.4-15.7 GHz band between aeronautical radionavigation and non-GSO MSS feeder links, Task Group 4/5 also drafted a liaison letter to the International Civil Aviation Organization, seeking to "exchange information on the technical and operational characteristics (including protection criteria) as well as implementation plans for relevant systems providing ARNS services (eg MLS) in the 5.00-5.25 GHz and 15.4-15.7 GHz and MSS feeder link systems."[33]

With regard to the feeder uplink, the recent international TG 4/5 meeting also determined that reverse-band working of FSS allocated frequencies was feasible for LEO MSS feeder links. Specifically, with regard to the Allotment Plan Bands (4.5-4.8 GHz, 6.725-7.025 GHz, 10.7-10.95 GHz, 11.2-11.45 GHz and 12.75-13.25 GHz), the meeting concluded that the studies submitted to the meeting demonstrated that sharing "was technically feasible, under the assumed value of EIRP density of non-GSO MSS feeder-

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[32] Draft Liaison Statement to Task Group 8/3 and Working Party [8B or 8C], Document 4-5/TEMP/7(Rev.1)-E, June 8, 1994.

[33] See Draft Liaison Letter to ICAO, Document 4-5/TEMP/6-E, June 7, 1994.